

Claims

- [c1] 1.A crash assessment and safety device activation system, including a host object, comprising:
- a first remote sensor coupled to the host object and adapted to detect a first target object within a region sensed by said first remote sensor and generate a first object signal from said first target object;
 - a first visual sensor adapted to sense at least a portion of said region sensed by said first remote sensor and therefrom generate a visual signal;
 - a first safety device actuator, coupled to the host object and adapted to activate a first safety device; and
 - a controller, coupled to the host object and adapted to receive said first object signal and said visual signal,
- said controller further adapted to generate a confirmation signal for said first target object through checking said first object signal with said visual signal, said controller further adapted to control said first safety device actuator in response to said confirmation signal.
- [c2] 2.The system of claim 1 wherein said remote sensor comprises one of a radar sensor, a lidar sensor or a vision-based sensor.
- [c3] 3.The system of claim 1 further comprising a second remote sensor coupled to the host vehicle and adapted to scan for said first target object within at least a portion of said region scanned by said first visual sensor and from a result of said scan, generate a second remote sensor signal.
- [c4] 4.The system of claim 3, wherein said first remote sensor and said second remote sensor are angled away from each other.
- [c5] 5.The system of claim 3, further comprising verifying that said first target object is a vehicle by polling said first remote sensor signal and said second remote sensor signal.
- [c6] 6.The system of claim 1, wherein said region sensed by said first remote sensor approximately equals at least one of 120 ms times the maximum allowable closing velocity of the target vehicle, or approximately 3m.

[c7] 7.The system of claim 1, further comprising a second safety device actuator coupled to the host vehicle and adapted to activate a second safety device.

[c8] 8.The system of claim 1, wherein said first safety device comprises one of an external airbag, a nose dip device, an internal airbag, or a seatbelt pre-tensioner.

[c9] 9.A crash threat assessment and damage mitigation method for a host vehicle including a first remote sensor coupled thereto and a visual sensor coupled thereto, comprising:
sensing a first target object with the first remote sensor;
generating a first object signal from said first remote sensor;
visually confirming said first target object with the visual sensor; and
deploying a safety device in response to a determination that said first target object is a vehicle and that the host vehicle will crash into said first target object such that a damage resultant from said crash to either said host vehicle or said target object will be reduced by deployment of said safety device.

[c10] 10.The method of claim 9, further comprising verifying said first object signal by polling said first object signal and a signal from a second remote sensor.

[c11] 11.The method of claim 9, further comprising sensing a region with said first remote sensor approximately equal to one of 120ms times a maximum allowable closing velocity of said target vehicle or 3m.

[c12] 12.The method of claim 9, further comprising determining whether a potential for collision of the host vehicle and said first target object is within a safety device activation threshold.

[c13] 13.The method of claim 9, wherein said step of deploying comprise deploying one of an external airbag or a nose dip device.

[c14] 14.A crash threat assessment and damage mitigation method for a host vehicle including a first remote sensor coupled thereto, a second remote sensor coupled thereto, and a visual sensor coupled thereto, comprising:
sensing a first target object with the first remote sensor;

generating a first object signal from the first remote sensor;
verifying said first object signal by polling said first object signal and a signal from the second remote sensor;
visually confirming said first target object with the visual sensor;
determining whether a potential for crash is within a safety device activation threshold; and
deploying an external airbag in response to a determination that said first target object is a vehicle and that the host vehicle will crash into said first target object such that a damage resultant from said crash will be reduced by deployment of said external airbag.

[c15] 15.The method of claim 14, further comprising sensing a region with the first remote sensor approximately equal to at least one of 120ms times a maximum allowable closing velocity of said target object, or 3m.

[c16] 16.The method of claim 14, further comprising sensing a second target object with the first remote sensor;
generating a second object signal from the first remote sensor;
verifying said second object signal by polling said first remote sensor signal and a signal from the second remote sensor;
visually confirming said second target object with the visual sensor; and
determining whether a potential for crash is within a safety device activation threshold.

[c17] 17.The method of claim 14 further comprising generating a bounding box around an image of said target object in response to said visual sensor signal, said bounding box including a number of vertical pixels corresponding to a maximum height of said target object and a number of horizontal pixels corresponding to a maximum width of said target object;
activating vehicle classifying logic in response to said height and said width of said target object;
classifying said target object based on at least one of said target object height and said target object width; and
activating a safety countermeasure based on said object classification

information.